of sulphate of potash and sand $\frac{3}{16}$ inch thick had formed across the middle of the bend. Strong sulphuric acid and potash were again poured into the limbs, and were now only separated by a thin plug of sulphate of potash. Platinum electrodes dipped into the liquids. Electromotive force 139. The circuit was closed for ten minutes.

	E. F.
14 seconds after insulation,	31
20 „ „	39
40 „ „	44
1 minute „	48
3 minutes „	74
5 „ „	89
10 „ „	98
20 „ „	105
65 „ „	119

The wires were again connected and the circuit left closed for about twenty-four hours. It was found that the plug had extended for about half an inch on the side of the sulphuric acid by the formation of crystals of sulphate of potash, but had not apparently changed where it was in contact with the potash.

X. A similar plug was formed in a second tube. Into one limb sulphuric acid, with a small quantity of permanganate of potash, was poured, into the other caustic potash: E. F. = 178. Circuit was closed for ten minutes.

	E. F.
10 seconds after insulation,	90
20 „ „	110
40 „ „	123
1 minute „	128
3 minutes „	138
9 „ „	148
19 „ „	150

II. "On Reversed Photographs of the Solar Spectrum beyond the Red, obtained on a Collodion Plate," in a Letter to Prof. Stokes. By Captain J. Waterhouse, Assistant Surveyor-General of India. Communicated by Professor Stokes. Received November 29, 1875.

Surveyor-General's Office,
Calcutta, November 5, 1875.

My dear Sir,—I have the pleasure to send you, by Overland Parcel Post, for presentation to the Royal Society, two photographs on glass of the solar spectrum, showing the extreme red rays below A, obtained on a dry collodion plate prepared with bromide of silver stained with a blue

dye *, and exposed to diffused daylight for a moment before being placed in the camera to receive the image of the spectrum. I also send another plate, also a dry bromide plate, stained with the same blue dye, and prepared at the same time and in the same manner as the other plates, but not exposed to light and quite free from fog; and you will observe that on this there is no trace of the reversed action in the red rays, and that the direct action only extends slightly below C.

This power of the red rays of the spectrum to neutralize the action of white light on sensitive daguerreotype plates was frequently noticed by Sir J. Herschel, Draper, Fizeau, Claudet, and other daguerreotypists about thirty years ago, but, so far as I can ascertain, it has never been observed on collodion plates. As collodion has so many advantages over the daguerreotype, it seems probable that this new extension of an old principle may have an important practical application in spectroscopic photography, particularly for the mapping of a part of the spectrum in which eye-observations can only be made with difficulty and under favourable circumstances.

The apparatus used for obtaining two of these photographs consisted of a Browning's chemical spectroscope, fitted with a very fine flint prism of 60°, and used in conjunction with one of Dallmeyer's rapid rectilinear lenses of 30″ focus. The rays of the sun were collected from a 9″ heliotrope, worked by hand, and thrown on the slit by means of a condensing-lens of 3″ diameter and 25″ focus. The aperture of the slit varied from ·003 to ·005, as marked on the plate.

The other single photograph was taken with a five-prism direct-vision spectroscope, by the same maker, also attached to the rapid rectilinear lens, and with the same arrangement of heliotrope and condenser.

The plates were prepared with a bromized collodion made by Rouch, sensitized in a bath of pure nitrate of silver at 16 per cent., then well washed in several changes of water and treated with a watery solution of the blue dye, again washed to remove the superfluous colour, and then dried. The colour of the prepared plates when dry was a light lavender. The development was by the alkaline method, followed by an intensification with acid, silver, and pyrogallic acid. Before being placed in the dark slide, the plates on which the extreme red rays are shown received a momentary exposure to diffused daylight by quickly opening and shutting the window of the dark room.

It will be observed that the best results have been obtained with long exposures of 30 or 40 minutes; and it is also necessary to work with

* I enclose a specimen of the dye. I do not know its chemical name, but it appears to belong to the aniline or some analogous series, and was obtained in the native market here. Dissolved in alcohol it is of a fine deep blue, but the addition of water changes the tint to a rich violet or purple.

[I have compared the specimen, as to its absorption-spectrum and the action of reagents, with authentic aniline blue, and the two appear to be identical.—G. G. S.]

rather an open slit, which injures the definition very much, so that the details of the many lines which I have ascertained to exist in the portion of the spectrum below A are not at all distinct; but it is possible that means may be found for obtaining better results with moderate exposure and a fine slit; and I hope to be able to continue the investigation with this object in view.

I have not been able yet to ascertain in what manner the blue dye acts; but that it plays an important part in obtaining the results is evident from the fact that on a dry bromide plate unstained the reversing effect of the red rays is not observed. I was led to use it from observing, during the course of an investigation of Dr. H. Vogel's important discovery of the effect of certain dyes on the sensibility of dry bromide-of-silver plates to the less refrangible rays, that on plates stained with aniline red, orange, green, and blue, the A and other lines in the red were often visible reversed; and there were traces of reversed action below A, but most markedly on the plates stained with the particular blue dye referred to. As I had not observed it on the plain unstained bromide plates, I attributed the effect to the action of the dyes, overlooking the fact that the plates were all slightly fogged. On repeating the experiments with the blue-stained plates, prepared in a purified bath and very free from fog, the reversed action was not perceptible; and recollecting the old daguerreotype experiments, the idea suggested itself of trying whether it could be obtained by means of the preliminary exposure to light.

On examining my spectrum negatives, I find that the same reversing action in the red is also to be traced on a few plates prepared with bromoiodized collodion, exposed wet and developed with the ordinary iron developer; but further experiments are required before I can ascertain whether good results can be obtained in this manner. The effect of staining the dry bromide films with other dyes has also to be investigated.

I would further draw your attention to the reversal of the blue and violet rays between H and F. I have observed this effect on all dry bromide plates, whether stained or unstained. It appears to be caused chiefly by overexposure, but may also be partly due to the action of the alkaline developer. On some plates it is more distinct and of greater extent than on others. I am scarcely sufficiently acquainted with the subject to venture on an explanation of this action of the blue rays, but may remark that they would appear to lose by long and excessive action the decomposing power they first exert on the bromide-of-silver film, and to exercise instead the neutralizing and bleaching action of the red rays. On the single photograph this reversed action of both sets of rays is well illustrated, and the whole spectrum is reversed from H to below A, the minimum of action being about F.

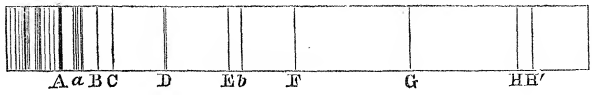
Should you consider the subject of sufficient interest, I trust you will

do me the favour of bringing this communication to the notice of the Society; and I need not say that I shall be exceedingly glad of any suggestions for improving the method and utilizing it in making systematic observations of any points which may be elucidated by its means.

Received December 6, 1875.

Surveyor-General's Office,
Calcutta, November 12, 1875.

DEAR SIR,—In continuation of my letter of last week I enclose a sketch of the lines in the extreme red rays, as nearly as I can make them out, from one of the photographs I have taken in the manner described, and the only one in which I have obtained the lines so clearly. It was taken at 1.48 P.M. on the 8th October (just at the close of our rainy season) with an exposure of 15 minutes, the same arrangement of spectroscope being used as for taking the two negatives I sent you last mail.



I have since writing made a successful experiment in obtaining reversed negatives on insolated, blue-stained, dry bromized collodion plates by means of the reversing action of the red rays passing through ruby glass, and also on similar plates prepared with bromized collodion coloured a bright yellow with tincture of annatto. I have also reason to believe that it will not be impossible to obtain the same reversing action through *blue* glass; but further trials are requisite.

I may also add that I have found that dry bromide plates prepared with the collodion containing annatto are more highly sensitive to the whole spectrum than any others; so that I have obtained the C, B, *a*, and A lines quite distinctly on such plates *unreversed*, and also one line below A at about the same distance from it as *a*.

III. "Report of the Meteorological Committee to the President and Council of the Royal Society on the Work done in the Meteorological Office since their appointment in 1866 to December 31, 1875."

The business of the Office will be reviewed under the three heads into which it is subdivided, and which are as follows:—

I. Ocean Meteorology.
II. Weather Telegraphy.
III. Land Meteorology of the British Islands.

I. OCEAN METEOROLOGY.

The most important task of the Committee at its first institution was